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OBSERVATIONS ON THE DISTRIBUTION AND SEASONALITY OF PORTUNID MEGALOPAE IN MISSISSIPPI COASTAL WATERS[1]

KENNETH C. STUCK AND HARRIET M. PERRY
Fisheries Research and Development Section,
Gulf Coast Research Laboratory,
Ocean Springs, Mississippi 39564

ABSTRACT Observations on the distribution and seasonality of common coastal portunid megalopae are presented. *Callinectes sapidus* megalopae were abundant from May through November. The megalopae of *C. similis*, though present throughout the year, peaked in numbers from February through April. With the exception of January, *Portunus* spp. megalopae occurred in all months, with maximum numbers collected in April. *Callinectes sapidus* megalopae commonly occurred at all stations, whereas, the megalopae of *C. similis* and *Portunus* spp. appeared to be limited by salinity.

INTRODUCTION

There have been few studies on the distribution of portunid larvae in coastal and offshore waters of the north central Gulf of Mexico. In Texas, Daugherty (1952), More (1969), and King (1971) discussed the movement of *Callinectes* megalopae through coastal passes. In Louisiana, Darnell (1959) speculated on the occurrence of blue crab larvae in Lake Pontchartrain, and Adkins (1972) presented data on the seasonality of blue crab larvae from Whiskey Pass. Andryszak (1979) studied the summer distribution of brachyuran larvae in offshore waters of southeastern Louisiana. The distribution of *Callinectes* larvae in Mississippi coastal waters was investigated by Perry (1975). Menzel (1964) studied the summer distribution of blue crab larvae in Gulf waters off Alligator Harbor, Florida. The present study is the first in which the distribution and seasonality of *C. sapidus* Rathbun, 1896, *C. similis* Williams, 1966, and *Portunus* spp. megalopae are treated separately.

MATERIALS AND METHODS

Monthly quantitative nekton samples were collected in Mississippi coastal waters from July 1974 to September 1979, using 1-m nekton nets fitted with 1,050-μ netting. Nets were equipped with flowmeters, and opening and closing devices. Simultaneous, 20-minute surface and bottom tows were taken at sites 3 miles south of (1) Horn Island Pass (station 86), (2) Dog Keys Pass (station 84), and (3) Ship Island Pass (station 82). All portunid megalopae were removed from the samples, counted and identified. In samples containing over 200 megalopae, an aliquot of 100 specimens was examined. Identifications were made using characters developed in a concurrent rearing program in which megalopae were collected monthly for 1 year and reared through early crab stages in the laboratory.

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RESULTS AND DISCUSSION

A total of 33,422 portunid megalopae was recovered from the 360 nekton samples examined (Table 1). The megalopae of *Callinectes sapidus* composed 70.8% of the total catch; *C. similis*, 11.5%; *Portunus* spp., 17.5%; and other Portunidae, < 0.1%. Although several species may be included under *Portunus* spp., all reared *Portunus* megalopae were *P. gibbesii*. Included under "other Portunidae" were several specimens of an undescribed giant megalopa and another undescribed form which appeared to share characters distinctive of both *Callinectes* and *Portunus*.

TABLE 1.

Total catch of portunid megalopae by taxa.

Taxa	Total Catch*	Total Standard Catch†	% of Standard Catch
Callinectes sapidus	24,171	31,681.1	70.8
C. similis	4,396	5,157.3	11.5
Portunus spp.	4,839	7,853.0	17.6
Other Portunidae	16	21.0	< 0.1
Total	33,422	44,712.4	100.0

*The sum of megalopae caught (number/20-minute tow) from each sample.
†The sum of the standardized numbers (number/1,000 m^3) of megalopae from each sample.

Concurrent trawl data were taken in coastal and estuarine waters. *Callinectes sapidus* juveniles and adults constituted approximately 53% of the total catch while *C. similis* contributed 38%; *Portunus* spp., 9%; and other portunids, < 1.0%.

Total catch of portunid megalopae at all three stations was similar; however, the percent composition of the catch differed greatly (Table 2).

TABLE 2.

Catch of major portunid taxa by station.

Station	Taxa	Total Catch*	Total Standard Catch†	% of Standard Catch
86	*C. sapidus*	6,662	7,950.2	49.5
	C. similis	2,730	3,159.7	19.7
	Portunus spp.	2,882	4,932.6	30.8
	Total	12,274	16,042.5	100.0
84	*C. sapidus*	7,672	11,851.9	73.1
	C. similis	1,431	1,739.9	10.7
	Portunus spp.	1,709	2,624.9	16.2
	Total	10,812	16,216.7	100.0
82	*C. sapidus*	9,837	11,880.9	95.5
	C. similis	235	257.7	2.1
	Portunus spp.	248	295.5	2.4
	Total	10,320	12,434.1	100.0

*The sum of megalopae caught (number/20-minute tow) from each sample.

†The sum of the standardized numbers (number/1,000 m^3) of megalopae from each sample.

Station 86 contributed 35.9% of the total catch consisting of *C. sapidus* (49.5%), *C. similis* (19.7%), *Portunus* spp. (30.8%), and unidentified Portunidae (0.1%). Station 84 yielded 36.3% of the total catch consisting of *C. sapidus* (73.1%), *C. similis* (10.7%), and *Portunus* spp. (16.2%). Station 82 was somewhat less productive, providing 27.6% of the total catch. *Callinectes sapidus* dominated the catch (95.5%), with *C. similis* (2.1%) and *Portunus* spp. (2.4%) far less abundant.

Overall percent composition as well as total numbers of *C. sapidus* megalopae increased from east to west, whereas the catch of *C. similis* and *Portunus* spp. was greatly decreased. This trend corresponds with an east-west salinity gradient characteristic of Mississippi coastal waters. Salinities were highest at station 86 throughout the sampling period with bottom waters averaging 32.1 ppt and surface waters, 25.5 ppt. A similar salinity regime was noted at station 84; bottom waters averaged 31.4 ppt and surface waters averaged 25.1 ppt. Salinities were lowest at station 82, averaging 28.3 ppt for bottom and 23.5 ppt for surface waters, with individual values seldom above 30.0 ppt. Although information on salinity preference of *C. similis* and *Portunus gibbesii* megalopae is not available, adults and juveniles are known to prefer coastal waters of high salinity (Christmas and Langley 1973). Bookhout and Costlow (1974) reported that salinities below 30.0 ppt were not favorable for development of *Portunus spinicarpus* larvae. Salinities optimal to maximum survival of *C. sapidus* megalopae (Costlow 1967) were observed at all stations, however; *C. sapidus* megalopae were more abundant at the lower salinity station 82. King (1971) reported greatest influx of *Callinectes* sp. megalopae to occur at 26.0 ppt salinity in Cedar Bayou.

Based on overall catch, portunid megalopae showed no affinity for surface or bottom waters (Table 3). Although twice the number of *C. similis* megalopae were caught in surface than bottom waters, the difference can be accounted for by a single large catch (1,434.8/1,000 m^3) taken at station 86 in March 1976. Most (15 of 20) large catches of *C. sapidus* megalopae (300+/tow) were taken on rising or peak tides; however, no preference for surface or bottom waters was observed. Individual large catches (100+ individuals) of *C. similis* and *Portunus* spp. megalopae were commonly taken during both rising and falling tides.

TABLE 3.

Catch of major portunid taxa by depth.

	Taxa	Total Catch*	Total Standard Catch†	% of Standard Catch
Surface	*C. sapidus*	11,534	13,632.6	65.2
	C. similis	3,290	3,780.3	18.1
	Portunus spp.	2,467	3,493.5	16.7
	Total	17,291	20,906.4	100.0
Bottom	*C. sapidus*	12,637	18,048.4	75.9
	C. similis	1,106	1,377.1	5.8
	Portunus spp.	2,372	4,359.5	18.3
	Total	16,115	23,785.0	100.0

*The sum of megalopae caught (number/20-minute tow) from each sample.

†The sum of the standardized numbers (number/1,000 m^3) of megalopae from each sample.

Previous reports on the vertical distribution of *Callinectes* megalopae appear conflicting. Williams (1971), King (1971), Perry (1975), and Smyth (1980) reported *Callinectes* megalopae to be in greatest abundance in surface waters. In contrast, 96% of the *Callinectes* megalopae collected by Tagatz (1968) and all of the megalopae collected by Sandifer (1973) were from bottom waters.

A definite seasonal pattern of abundance for portunid megalopae was observed (Figure 1). *Callinectes similis* megalopae were collected throughout the year, occurring in greatest abundance from February through April with a March peak. This was followed by an April peak of *Portunus* spp. during which concentrations of up to 1,670.3/1,000 m^3 were observed. *Callinectes sapidus* megalopae were collected in every month except January and February. Two peaks in abundance were observed, the first in late spring-early summer, and a second, larger peak in the late summer-early fall during which maximum densitites of 2,530.8/1,000 m^3 were obtained. Large catches of *C. sapidus* megalopae were not made between December and April.

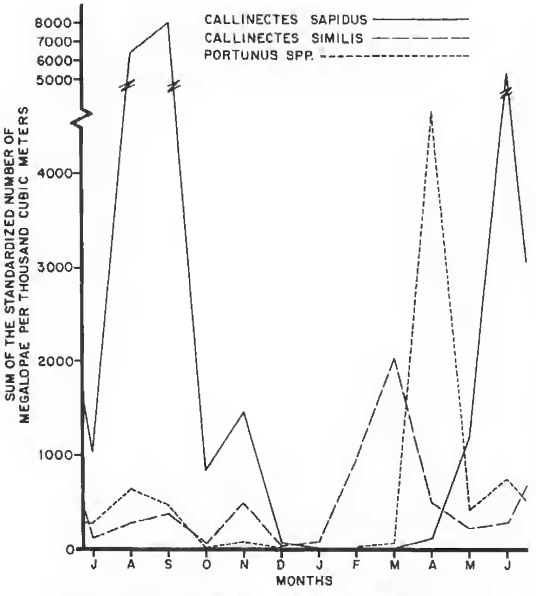

Figure 1. Total standard catch of megalopae by month.

The seasonal occurrence of *C. sapidus* megalopae reported here conflicts, in part, with previous studies from the northern Gulf. More (1969) and King (1971) reported a February-March peak of *Callinectes* spp. megalopae and suggested these megalopae represented an overwintered spawn from the previous fall. While a February-April peak of portunid megalopae was also observed in the present study, it consisted almost entirely of *C. similis* and *Portunus* spp. Adkins (1972) also reported a February peak of blue crab megalopae from Whiskey Pass, Louisiana. Portunid megalopae and early crabs collected from this same site during February and March 1981 were provided to the authors by Mr. Adkins. All were found to be *C. similis*. Perry (1975) also reported a February occurrence of *C. sapidus* megalopae based on identification of young crabs reared from megalopae. Subsequent examination of these crabs found them to be *C. similis*. Abundance of *Callinectes sapidus* megalopae during the late spring through fall months observed in the present study is in general agreement with previous studies.

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REFERENCES CITED

Adkins, G. 1972. A study of the blue crab fishery in Louisiana. *La. Wildl. Fish. Comm. Tech. Bull.* 3:1–57.

Andryszak, B. L. 1979. Abundance, distribution and partial descriptions of reptant decapod crustacean larvae collected from neritic Louisiana waters in July, 1976. Master's thesis, Louisiana State University, Baton Rouge, Louisiana. 102 pp.

Bookhout, C. G. & J. D. Costlow, Jr. 1974. Larval development of *Portunus spinicarpus* reared in the laboratory. *Bull. Mar. Sci.* 24:20–51.

Christmas, J. Y. & W. Langley. 1973. Estuarine invertebrates, Mississippi. Pages 255–319 in J. Y. Christmas (ed.), *Gulf of Mexico Estuarine Inventory and Study, Mississippi.* Gulf Coast Research Laboratory, Ocean Springs, Mississippi.

Costlow, J. D. 1967. The effect of salinity and temperature on survival and metamorphosis of megalops of the blue crab *Callinectes sapidus*. *Helgol. wiss. Meeresunters.* 15:84–97.

Darnell, R. M. 1959. Studies of the life history of the blue crab (*Callinectes sapidus* Rathbun) in Louisiana waters. *Trans. Am. Fish. Soc.* 88(4):294–304.

Daugherty, F. M., Jr. 1952. The blue crab investigation, 1949–50. *Tex. J. Sci.* 4(1):77–84.

King, B. D., III. 1971. Study of migratory patterns of fish and shellfish through a natural pass. *Tex. Parks Wildl. Dep., Tech. Ser.* 9:1–54.

Menzel, R. W. 1964. Report on preliminary studies on the blue crab in Alligator Harbor and adjacent Gulf of Mexico with some observations on stone crab larvae. Oceanographic Institute, Florida State University. 12 pp.

More, W. R. 1969. A contribution to the biology of the blue crab (*Callinectes sapidus* Rathbun) in Texas, with a description of the fishery. *Tex. Parks Wildl. Dep., Tech. Ser.* 1:1–31.

Perry, H. M. 1975. The blue crab fishery in Mississippi. *Gulf. Res. Rept.* 5(1):39–57.

Sandifer, P. A. 1973. Distribution and abundance of decapod crustacean larvae in the York River estuary and adjacent lower Chesapeake Bay, Virginia, 1968–1969. *Chesapeake Sci.* 14(4): 235–257.

Smyth, P. O. 1980. *Callinectes* (Decapoda: Portunidae) larvae in the Middle Atlantic Bight, 1975–77. *Fish. Bull.* 78(2):251–265.

Tagatz, M. E. 1968. Biology of the blue crab, *Callinectes sapidus* Rathbun, in the St. Johns River, Florida. *U.S. Fish. Wildl. Serv., Fish. Bull.* 67(1):17–33.

Williams, A. B. 1971. A ten-year study of meroplankton in North Carolina estuaries: annual occurrence of some brachyuran developmental stages. *Chesapeake Sci.* 12:53–61.